

The influence of adaptive leadership and teacher motivation on learning innovation in vocational school: Innovative behavior mediation

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Abstract: There is limited research, directly or indirectly, examining the influence of adaptive leadership and teacher motivation on instructional innovation through teachers' innovative behavior in the context of vocational high schools. This study aims to analyze the impact of principals' adaptive leadership and teacher motivation on instructional innovation, with innovative behavior serving as an intervening variable. A quantitative research design utilizing path analysis was employed. The study population consisted of all 361 teachers from state vocational high schools in West Pasaman Regency; a sample of 186 teachers was selected based on tenure strata. The results indicate that principals' adaptive leadership has a positive but non-significant effect on teacher instructional innovation. Teacher motivation has a positive and significant effect on teacher instructional innovation. Innovative behavior does not mediate the effect of principals' adaptive leadership on teacher instructional innovation, whereas it does mediate the effect of teacher motivation on teacher instructional innovation. Collectively, principals' adaptive leadership, teacher motivation, and innovative behavior have a positive and significant impact on teacher instructional innovation. Although principals' adaptive leadership positively influences innovative behavior and instructional innovation, the effect is not statistically significant. Teacher motivation is a crucial factor in enhancing instructional innovation, whereas principals' adaptive leadership has not yet demonstrated a significant influence. Innovative behavior acts as a mediator in the relationship between teacher motivation and instructional innovation, but fails to mediate the relationship between principals' adaptive leadership and instructional innovation.

Keywords: Adaptive leadership, instructional innovation, innovative behavior, motivation

Abstrak: Penelitian yang secara langsung maupun tidak langsung mengkaji pengaruh kepemimpinan adaptif dan motivasi guru terhadap inovasi pembelajaran melalui perilaku inovatif guru dalam konteks Sekolah Menengah Kejuruan masih terbatas. Penelitian ini bertujuan untuk menganalisis dampak kepemimpinan adaptif kepala sekolah dan motivasi guru terhadap inovasi pembelajaran, dengan perilaku inovatif sebagai variabel antara (intervening). Desain penelitian kuantitatif yang menggunakan analisis jalur (path analysis) diterapkan dalam studi ini. Populasi penelitian mencakup seluruh 361 guru dari SMK Negeri di Kabupaten Pasaman Barat; sampel sebanyak 186 guru dipilih berdasarkan strata masa kerja. Hasil penelitian menunjukkan bahwa kepemimpinan adaptif kepala sekolah memiliki pengaruh positif namun tidak signifikan terhadap inovasi pembelajaran guru. Motivasi guru memiliki pengaruh positif dan signifikan terhadap inovasi pembelajaran guru. Perilaku inovatif tidak memediasi pengaruh kepemimpinan adaptif kepala sekolah terhadap inovasi pembelajaran guru, namun memediasi pengaruh motivasi guru terhadap inovasi pembelajaran guru. Secara bersama-sama, kepemimpinan adaptif kepala sekolah, motivasi guru, dan perilaku inovatif memberikan dampak positif dan signifikan terhadap inovasi pembelajaran guru. Meskipun kepemimpinan adaptif kepala sekolah berpengaruh positif terhadap perilaku inovatif dan inovasi pembelajaran, pengaruh tersebut tidak signifikan secara statistik. Motivasi guru merupakan faktor krusial dalam meningkatkan inovasi pembelajaran, sedangkan kepemimpinan adaptif kepala sekolah belum menunjukkan pengaruh yang signifikan. Perilaku inovatif berperan sebagai mediator dalam hubungan antara motivasi guru dan inovasi pembelajaran, namun tidak berhasil memediasi hubungan antara kepemimpinan adaptif kepala sekolah dan inovasi pembelajaran.

Kata kunci: Kepemimpinan adaptif, inovasi pembelajaran, perilaku inovatif, motivasi

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INTRODUCTION

Learning innovation is crucial for realizing the transformation of the education system in the modern era. According to Rogers (2003), the diffusion of innovations theory posits that an innovation is an idea, activity, or item perceived as novel by an individual or a collective, aimed at accomplishing certain objectives more efficiently. In the educational context, learning innovation is realized through curriculum updates, teaching strategies, and the use of technology aimed at improving the quality of graduates (Damopolii et al., 2021; Latjompoh et al., 2026; Safitri et al., 2021). Therefore, the success of 21st-century education is largely determined by the ability of educational institutions to adopt and implement learning innovations sustainably.

Mulyasa (2018) explains that the sustainability of vocational education without learning innovation will lead to a stagnation in less adaptive learning routines. Rigid conventional learning has the potential to trigger a mismatch between graduate competencies and the technical qualifications required by the workplace and industry (Muharam et al., 2026; Purnawirawan et al., 2023; Ridwan et al., 2025). Data from the Central Statistics Agency on the national Open Unemployment Rate also shows that vocational high school graduates still account for the largest share of unemployment. One root cause is the lack of innovative incentives in the learning process to develop competitive human resources. Therefore, learning innovation cannot be viewed as merely a supplementary activity, but rather as a key driving force in building a responsive, meaningful, and highly competitive vocational ecosystem..

The success of implementing learning innovation is largely determined by managerial factors, internal drivers, and the concrete actions of educators. As Bush (2020) notes, the effectiveness of school reform is determined by leadership, motivation, and individual behavior as implementers in the field. Principal leadership serves as a strategic direction provider, while teacher motivation acts as an internal force for accepting change (Herni et al., 2024; Marlianti et al., 2023). When these leadership and motivation factors combine well, innovative individual behaviors are formed that directly encourage the birth of sustainable learning innovation.

Based on the 2025 West Pasaman Regency Education Report, the learning quality indicator in the region is in the Moderate category, with a score of 64.3 on a scale of 100. This achievement indicates that the learning process in educational units, especially vocational schools, is not fully optimal. The moderate category indicates that there are still weaknesses in aspects of the learning process, such as interaction between teachers and students, the use of innovative learning strategies, and active student involvement. This is in line with the Academic Supervision Report of the West Pasaman Regency Vocational School Supervisor, which shows that 74.2% of teachers rely on printed textbooks without modification. This indicates that teachers rarely design interactive learning media or teaching modules based on the latest DUDI (Business and Industry) needs.

Based on the author's observations from November 2025 to March 2026 at the State Vocational Schools in West Pasaman Regency, the following phenomena were found related to learning innovation: (1) teachers tend to use conventional methods (one-way lectures) and are reluctant to try collaborative project-based methods, (2) minimal creation of interactive learning media; Teachers often rely on old, unmodified printed textbooks; (3) the use of digital devices, Learning Management Systems (LMS), or modern vocational

simulation applications is still very low and limited; and (4) the classroom atmosphere tends to be passive, where students are less stimulated to think critically, creatively, and independently in vocational practice.

The main factor strongly suspected of triggering these obstacles is the suboptimal effectiveness of the principal's adaptive leadership. Heifetz et al. (2009) stated that adaptive leadership is the ability to direct an organization through complex challenges and bridge structural and cultural changes. Based on the consolidation at SMKN West Pasaman Regency, the following problems were found related to the adaptive leadership of the principal: (1) the principal was slow to respond to curriculum shifts and the latest competency requirements requested by DUDI, (2) school policies tended to be rigid, bureaucratic, and less adaptive to emergency situations or new technological developments, (3) a lack of authority and trust given to potential young teachers to lead innovation projects, (4) minimal facilitation or budget allocated specifically for training, education and training, or regular teacher competency workshops, and (5) low communication and collaboration between teachers (internal MGMP) and parent/committee involvement in supporting innovation programs.

In addition to leadership factors, teacher internal motivation also plays an equally important role in encouraging innovation. According to Robbins and Judge (2018), and Kurniawan et al. (2021), motivation is a process that explains the intensity, direction, and persistence of individuals in achieving their goals, including in this case in implementing teaching innovation. The phenomenon of teacher work motivation at SMKN (State Vocational High School) in West Pasaman Regency shows that some teachers still only carry out learning activities to fulfill mandatory face-to-face hours without optimally considering the quality of graduates. Furthermore, the low interest of teachers in participating in outstanding teacher competitions, writing scientific papers, and producing learning innovations reflects a lack of encouragement to develop professional competencies. Teachers also tend to be reluctant to participate in training independently without instructions or incentives from the department. This condition is exacerbated by the absence of a clear reward system from the principal for high-achieving and innovative teachers.

Ultimately, all of the above variables boil down to how Teacher Innovative Work Behavior is manifested in schools. Jong and Hartog (2010) explain that innovative behavior encompasses a series of individual activities that lead to the discovery, formation, and application of new and useful ideas. The phenomenon of teacher behavior at SMKN (Vocational High School) in West Pasaman Regency shows that some teachers are still less active in conducting self-evaluations and seeking the latest references to address learning challenges. When faced with limited practical facilities, teachers tend to complain rather than seek innovative alternative solutions. Furthermore, ideas generated in meetings often go unrealized due to limitations in developing action plans or activity proposals. This condition is exacerbated by teachers' lack of consistency and sustainability in developing and implementing new learning models or teaching aids in the classroom.

Research by Suhastuti et al. (2025) shows that the principal's leadership coefficient as an innovator (0.588) has a positive and significant effect on teacher teaching innovation at SDN 49 Mandau. Penelitian Hendri and Iswantir (2024) research showed that work motivation had a positive and significant effect on teacher innovation at the Driving School

in Bukittinggi City, amounting to 33.5%. Consistent with Sudar (2023) research, the results showed that achievement motivation significantly influenced teacher innovation, with a calculated F value of 27.324, a table F value of 3.91 (0.05; 141), and a table F score of 6.81 (0.01; 141).

This concise research has investigated, directly or indirectly, the impact of adaptive leadership and teacher motivation on learning innovation through teachers' creative behavior in vocational high schools. Consequently, this research was conducted to investigate learning innovation in vocational high schools in West Pasaman Regency and the determinants that affect it. This research seeks to examine the impact of the principal's adaptive leadership and teacher motivation on learning innovation, using creative behavior as a mediating variable.

METHOD

This research uses a quantitative approach using path analysis. This path analysis uses structural equations to examine the causal relationship between the dimensions of the principal's adaptive leadership (X1), teacher motivation (X2), and learning innovation (Y) through innovative behavior (Z). Therefore, this study will examine in depth how the principal's adaptive leadership and teacher motivation can influence learning innovation, both directly and indirectly through innovative behavior.

The population of this study was all 361 SMKN teachers in West Pasaman Regency. The sample size was drawn from the tenure stratum, with a total of 186 teachers. The data collection tool used in this study was a questionnaire. The questionnaire was structured on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaires for the principal's adaptive leadership, teacher motivation, learning innovation, and innovative behavior each totaled 15 items.

Descriptive analysis was conducted by presenting the primary data in a frequency distribution table, calculating the total score, the average score, and the level of achievement of the respondents. Data analysis used the Partial Least Squares (PLS) approach. The assessment of the structural model, or inner model, in the SEM-PLS methodology evaluates the robustness of the connections among latent constructs within the model, as well as the degree to which the model explains the dependent variable (Hair et al., 2017). The indicators used in this evaluation include: (1) The R² value or coefficient of determination is used to measure how much proportion of the dependent construct variance can be explained by the independent construct in the structural model, and (2) Q² or predictive relevance is used to evaluate the model's predictive ability on the dependent variable. To assess the significance of the influence between variables, a bootstrapping procedure is necessary. The bootstrapping procedure uses the entire original sample for resampling. The procedure for testing the mediation effect is carried out by estimating the direct influence of the independent variable on the dependent variable and the path coefficient c must be significant.

RESULTS AND DISCUSSION

Outer model test results (measurement model)

The evaluation of outer loadings seeks to determine the relationship between item or indicator scores and their construct concept scores, reflecting the validity of a statement

item. The assessment of outer loadings is based on the results of a pilot questionnaire administered for all study variables. Analytical methods used to evaluate outside loadings include Convergent Validity and Composite Reliability.

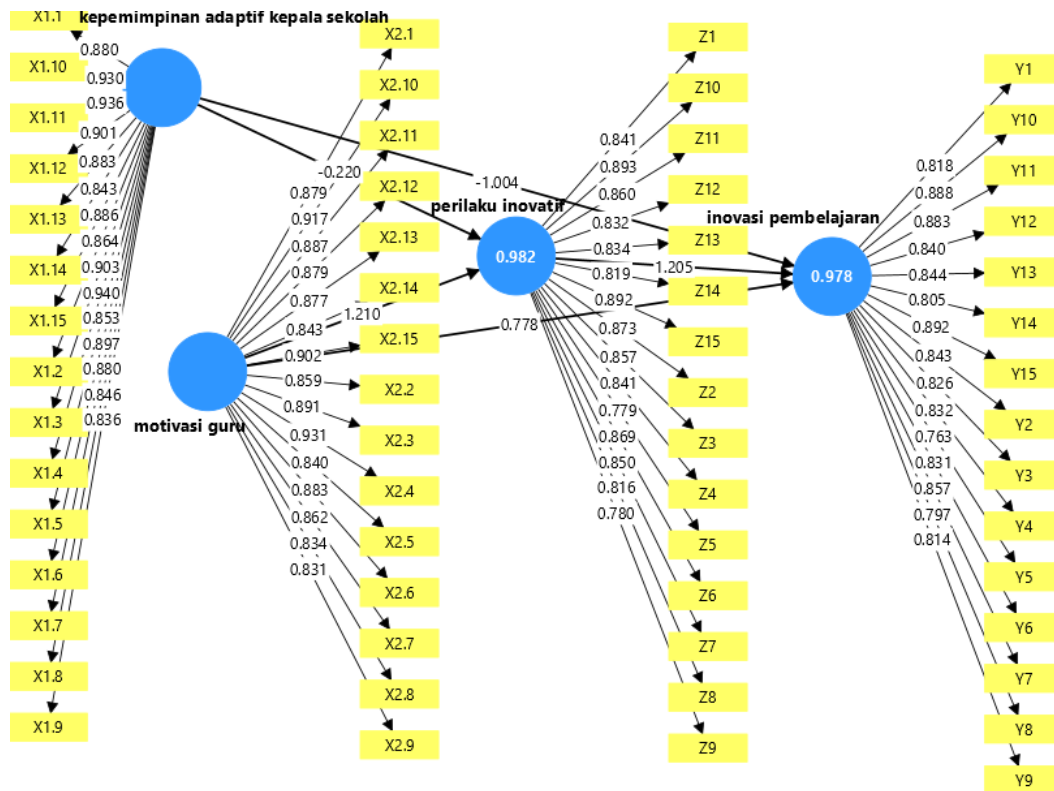


Fig. 1. Structural model

Based on Figure 1, it can be seen that the statement items for the variables of learning innovation, innovative behavior, teacher motivation and adaptive leadership of the principal have a convergent validity value above 0.7 which is said to be valid, so that the constructs for all variables are not eliminated from the model, meaning that all variable items have a high level of validity and have met convergent validity.

Table 1. Average variance extracted (AVE) value

Variables	AVE
Learning innovation	0.699
Innovative behavior	0.711
Principal adaptive leadership	0.785
Teacher motivation	0.765

According to Table 1, it may be inferred that all constructs or variables listed satisfy the standards for strong validity. This is shown by the Average Variance Extracted (AVE) figure above 0.50, as advised. This indicates that each variable is able to explain more than 69.9% of the variance in its indicators and confirms that the measurement instrument is highly accurate and consistent in reflecting the latent constructs studied.

Table 2. Reliability values

Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Learning innovation	0.969	0.970	0.972
Innovative behavior	0.971	0.971	0.974
Principal adaptive leadership	0.980	0.981	0.982
Teacher motivation	0.978	0.978	0.980

According to the SmartPLS results shown in Table 2, the composite reliability and Cronbach's alpha metrics for every construct or variable exceeded 0.70. This signifies that all metrics within each construct exhibited strong coherence in assessing the specified variables. Consequently, one may ascertain that the data is reliable.

Testing the inner model (structural model)

This assessment seeks to examine the robustness of the association between latent constructs inside the model, as well as to determine the degree to which the independent variables may elucidate the dependent variables.

Table 3. Evaluation of R square value

Variables	R Square	Adjusted R-square
Learning Innovation	0.978	0.978
Innovative Behavior	0.982	0.982

Table 3 shows the R-square value for the learning innovation construct of 0.978, or 97.8%, which illustrates the significant contribution received by the learning innovation construct from the principal's adaptive leadership, teacher motivation, and innovative behavior. This reflects the simultaneous influence of the principal's adaptive leadership, teacher motivation, and innovative behavior on learning innovation. Simultaneously, innovative behaviour, at 0.982 or 98.2%, indicates the substantial influence exerted by the principal's adaptive leadership and teacher motivation on the innovative behaviour construct. This illustrates the concurrent impact of the principal's adaptive leadership and teacher motivation on innovative conduct. A higher R-square value indicates a stronger capacity of the exogenous construct to elucidate the endogenous variable, hence enhancing the structural equation.

The results of the predictive relevance (Q^2) calculation in this study are as follows:

$$Q^2 = 1 - (1 - R^2_1) (1 - R^2_2)$$

$$Q^2 = 1 - (1 - 0.982) (1 - 0.978)$$

$$Q^2 = 1 - (0.018) (0.022)$$

$$Q^2 = 1 - 0.000396$$

$$Q^2 = 0.999$$

Note: R^2_1 = R^2 Value of Innovative Behavior

R^2_2 = R^2 Value of Learning Innovation.

The predictive relevance (Q^2) calculation yielded a value of 0.999. This indicates that the model in this study has good predictive relevance ($0.999 > 0$). This predictive relevance (Q^2) value also indicates that the model has good predictive relevance for the construct.

Results of the direct effects test

Hypothesis testing in SEM-PLS is carried out through bootstrapping, which is a resampling technique used to estimate the significance of the relationship between variables in a structural model.

Table 4. Direct effects values

Hypothesis	Original Sample	T Statistics (O/STDE)	P Values	Conclusion
Principal's adaptive leadership -> Learning innovation	-1.269	1.386	0.166	Hypothesis 1 Rejected
Teacher motivation -> Learning innovation	2.236	2.470	0.014	Hypothesis 2 Accepted
Innovative behavior -> Learning innovation	1.205	6.010	0.000	Hypothesis 3 Accepted
Principal's adaptive leadership -> Innovative behavior	-0.220	0.854	0.393	Hypothesis 4 Rejected
Teacher motivation -> Innovative behavior	1.210	4.700	0.000	Hypothesis 5 Accepted

First hypothesis

In Hypothesis 1 (Table 4), the correlation between the principal's adaptive leadership and learning innovation presents an initial sample estimate of -1.269, accompanied by a t-statistic of 1.386, which is below the t-table threshold of 1.96, and a P-value of 0.166 above the alpha level of 0.05. Consequently, Hypothesis 1 is dismissed, indicating that the principal's adaptive leadership has a favourable albeit little influence on learning innovation. This suggests that the principal's adaptive leadership has a favourable although negligible correlation with learning innovation.

The insignificant effect of the principal's adaptive leadership on learning innovation may be due to the fact that learning innovation is not solely determined by the principal's ability to lead change. Learning innovation is a behavior directly carried out by teachers in the learning process. Teachers must have the willingness, ability, creativity, and courage to change learning methods, utilize technology, develop learning media, and implement learning strategies that are appropriate to students' needs. Learning innovation is a form of teacher professional action that involves creativity, adaptability, and the use of new technology and learning strategies to create learning experiences tailored to students' needs (Kurniawan et al., 2021; Yurida et al., 2021). Therefore, even if a principal demonstrates adaptive leadership, this does not necessarily automatically encourage teacher innovation.

Furthermore, the influence of principal leadership on learning innovation likely requires intermediary processes and mechanisms. A principal's adaptive leadership can create a supportive environment for change, but teachers still need competence, motivation,

facilities, time, training, and opportunities to implement innovation. If one or more of these factors are inadequate, the principal's adaptive leadership will not produce significant changes in learning innovation. Therefore, the insignificant influence of the principal's adaptive leadership in this study does not mean that adaptive leadership is unimportant for learning innovation. These results rather indicate that existing adaptive leadership is not strong enough or has not directly translated into the support needed by teachers to produce learning innovation. Principals need to strengthen their ability to identify internal barriers and potentials, then use the results of this mapping as a basis for providing concrete support to teachers. If adaptive leadership can directly connect with teachers' needs and activities in learning, the opportunity to improve learning innovation will be greater. Principals need to build organizational capacity by mapping needs, providing professional support, and creating an environment that encourages creativity and changes in learning practices (Harris & Jones, 2020).

Second hypothesis

In Hypothesis 2 (Table 4), the correlation between educator motivation and learning innovation presents an initial sample estimate of 2.236, accompanied by a t-statistic of 2.470, above the t-table value of 1.96, and a P-value of 0.014, which is less than alpha 0.05. Consequently, Hypothesis 2 is affirmed, indicating that teacher motivation has a beneficial and substantial influence on learning innovation. This suggests that educator motivation is strongly correlated with learning innovation.

The results of this study also align with research by Hendri and Iswantir (2024), which demonstrated an influence between work motivation and teacher innovation behavior. This research reinforces the view that teacher motivation can be a factor driving innovative behavior in carrying out professional duties. Teachers' teaching motivation in relation to learning innovation indicates that teaching motivation is a relevant aspect in encouraging innovation in the learning process. Consequently, the findings of this study corroborate earlier research indicating that highly driven educators are more inclined to implement changes, enhance their abilities, and explore innovative methods to elevate learning quality.

The significant influence of teacher motivation on learning innovation in this study shows that learning innovation requires encouragement from within the teacher. Principals can provide supportive policies, facilities, and environments, but teachers' decisions to try new approaches, develop media, use technology, and improve learning methods are heavily influenced by their motivation. Teachers with high motivation are more open to change, have a willingness to learn, are more resilient when faced with difficulties, and are more driven to find solutions to learning problems (Hayuana et al., 2024). Therefore, the higher the teacher's motivation, the greater the likelihood of generating and implementing innovations in learning.

Third hypothesis

The relationship between innovative behaviour and learning innovation in Hypothesis 3 is supported by a t-statistic of 6.010, which is greater than the t-table (1.96), and a P-value of 0.000, which is less than alpha 0.05. Consequently, Hypothesis 3 is confirmed, indicating that innovative behaviour has a substantial and beneficial impact on

the acquisition of innovation. This suggests that there is a substantial positive correlation between learning innovation and innovative behaviour.

This finding is also supported by research by Sudar (2023). This study demonstrated that teachers' innovative behavior is a crucial skill in addressing changes in the education system and improving the learning process. Their results showed that cognitive flexibility and positive affect can predict teachers' innovative behavior, while negative affect negatively influences innovative behavior. These findings support the findings of this study, which suggest that teachers who are able to perceive change, seek alternatives, and approach problems flexibly are more likely to demonstrate innovative behavior in learning.

The significance of the influence of innovative behavior on learning innovation in this study is understandable because the two variables are conceptually very close. Innovative behavior is the process of teachers seeking opportunities, generating ideas, championing them, and implementing them. Learning innovation is a concrete manifestation of change and renewal within the learning process. Therefore, when teachers exhibit high levels of innovative behavior, they are more likely to actively make changes to methods, strategies, media, technology, and learning activities (Nunaki et al., 2025; Yomaki et al., 2023). Conversely, when innovative behavior is low, teachers tend to maintain their usual learning patterns, reducing the opportunity for learning innovation.

Fourth hypothesis

The original sample estimate of -0.220 and a t-statistic of 0.854 in Hypothesis 4 are both less than the t-table (1.96) and have a p-value of 0.393, which is greater than alpha 0.05. Consequently, Hypothesis 4 is denied, indicating that the principal's adaptive leadership is not a significant factor in the development of innovative behaviour. This suggests that the principal's adaptive leadership has a negligible positive correlation with innovative behaviour.

The insignificant effect of the principal's adaptive leadership on teacher innovative behavior may be due to the fact that innovative behavior is closely related to individual factors and the teacher's work environment, and therefore is not solely determined by the principal's leadership. Teachers can have an adaptive principal, but they may not necessarily have the motivation, self-confidence, competence, creativity, risk-taking skills, or sufficient opportunities to develop innovative ideas. Teachers can have good leadership support, but their ability to generate learning innovations is still influenced by internal factors such as motivation, self-efficacy, and the teacher's belief in their ability to develop and implement new ideas (Zainal & Mohd Matore, 2021). Thus, although the principal's adaptive leadership is in the good category, the quality of adaptive leadership cannot be seen as the sole factor determining teacher innovative behavior. Principals can create conditions that enable innovation, but the decision to explore ideas, generate ideas, champion ideas, and implement them remains heavily influenced by teacher readiness and encouragement, as well as a supportive work environment.

Fifth hypothesis

In Hypothesis 5, the t-statistic of 4.700 is greater than the t-table (1.96), and the original sample estimate of 1.210 and P-value of 0.000 are both less than alpha 0.05. Consequently, Hypothesis 5 is accepted, indicating that innovative behaviour is significantly

and positively influenced by teacher motivation. This suggests that innovative behaviour is significantly positively correlated with teacher motivation.

The significant influence of teacher motivation on innovative behavior in this study is understandable because innovative behavior requires initiative and encouragement from within the teacher. Innovative behavior does not emerge solely due to instructions from the principal; it also requires the teacher's willingness to seek opportunities, learn new things, generate ideas, champion ideas, and implement them. This process is influenced not only by organizational factors but also by personal factors such as creativity, autonomy, and the teacher's belief in their ability to make changes (Chen, 2024). Teachers with high motivation are more active in seeking new information and experiences and are more open to change. Conversely, teachers with low motivation tend to be more comfortable maintaining familiar work methods, thus reducing the opportunity for innovative behavior.

Indirect effect

Based on the SmartPLS 4 test results in Table 5, the results of the Specific Indirect Effect hypothesis test are shown, which is the direct influence of the principal's adaptive leadership construct on learning innovation through innovative behavior and the influence of the teacher motivation construct on learning innovation through innovative behavior. If the original sample direct effect value is smaller than the original sample indirect effect value, it is proven to mediate, then the hypothesis is supported, and vice versa.

Table 5. Specific indirect effect

Hypothesis	Original Sample	T Statistics (O/STDEV)	P Values	Conclusion
Principal's adaptive leadership -> Innovative behavior -> Learning innovation	-0.265	0.876	0.381	Hypothesis 6 Rejected
Teacher motivation -> Innovative behavior -> Learning innovation	1.458	4.162	0.000	Hypothesis 7 Accepted

Sixth hypothesis

In Hypothesis 6, regarding the relationship between the principal's adaptive leadership and learning innovation through innovative behavior, the original sample estimate was -0.265, and the original sample direct effect of the principal's adaptive leadership on learning innovation was -1.269. The original sample indirect effect was greater than the original sample direct effect ($-0.265 > -1.269$). The t-statistic of 0.876 was smaller than the t-table (1.96), and the P-value of $0.381 > \alpha 0.05$, indicating that the indirect effect of the principal's adaptive leadership on learning innovation through innovative behavior was insignificant. This implies that innovative behaviour was unable to mitigate the impact of the principal's adaptive leadership on learning innovation. Hypothesis 6 was rejected.

These results indicate that teacher innovative behavior is not yet a sufficient intermediary variable linking the principal's adaptive leadership and learning innovation.

In other words, although the principal's adaptive leadership was in the good category and teacher innovative behavior was also in the good category, their influence did not form a mechanism strong enough to indirectly increase learning innovation. This can occur because innovative behavior is not only influenced by leadership but also requires work engagement, creativity, proactive personality, and individual teacher capacity so that leadership support can be translated into innovative actions in learning (Siregar et al., 2025).

The insignificant mediation effect can be understood from the results of the previous hypothesis testing. In the fourth hypothesis, the principal's adaptive leadership did not significantly influence teacher innovative behavior. Meanwhile, in the third hypothesis, innovative behavior had a positive and significant effect on learning innovation. This condition indicates that although innovative behavior plays a significant role in enhancing learning innovation, it has not yet formed or increased as a result of the principal's adaptive leadership. Therefore, innovative behavior has not been able to perform a significant mediating function. This finding suggests that the presence of a mediator influencing the dependent variable is not sufficient to produce a mediating effect if the independent variable is unable to exert sufficient influence on the mediator. The insignificant mediation of innovative behavior can also occur because learning innovation is not only shaped by adaptive leadership and innovative behavior but is also influenced by various other factors. These factors can include professional and pedagogical competence, the ability to utilize technology, the availability of facilities and infrastructure, school culture, workload, opportunities to participate in training, and peer support (Cai & Tang, 2021; Darmawan et al., 2026; Suwono & Prasetyo, 2026).

Seventh hypothesis

In Hypothesis 7, concerning the relationship between teacher motivation and learning innovation through innovative behavior, the original sample estimate was 1.458, while the original sample direct effect of teacher motivation on learning innovation was 2.236. The original sample indirect effect was smaller than the original sample direct effect ($1.458 < 2.236$). The t-statistic of 4.162 was greater than the t-table (1.96), and the P-value was $0.000 < \alpha 0.05$, suggesting that the indirect effect of teacher motivation had a significant positive relationship with learning innovation through innovative behaviour. This implies that innovative behaviour can mediate the impact of teacher motivation on learning innovation. Hypothesis 7 is accepted.

The results of this study indicate that innovative behavior can act as a mediating variable in the relationship between teacher motivation and learning innovation. These findings indicate that teacher motivation not only directly influences learning innovation but also encourages innovative behavior, which further strengthens innovation in the learning process. Innovative behavior can function as a mechanism that translates teachers' internal motivation into concrete instructional innovation because motivated teachers are more likely to generate, promote, and implement new ideas in their teaching practices (Kato et al., 2023; Qin et al., 2025). Teachers with high motivation tend to be more active in seeking new knowledge, developing competencies, trying various learning methods, and utilizing technology as part of efforts to improve the quality of learning. Therefore, the

higher a teacher's motivation, the greater their tendency to display innovative behavior that contributes to the creation of learning innovation.

Joint hypothesis testing (F test)

Based on the SmartPLS 4 test results in Table 6, the simultaneous hypothesis testing for Hypothesis 8 yields an F-statistic of 2,566.228, greater than the F-table (3.05), and a P-value of $0.000 < \alpha \ 0.05$. Therefore, Hypothesis 8 is accepted, indicating that the principal's adaptive leadership, teacher motivation, and innovative behavior collectively have a significant effect on learning innovation.

Table 6. F test results

Hypothesis	F Statistics	P Values	Conclusion
Adaptive leadership of school principals, teacher motivation and innovative behavior -> Learning innovation	2.566,228	0,000	Hypothesis 8 Accepted

This finding indicates that the better the principal's adaptive leadership implementation, the higher the teacher motivation, and the stronger the teacher's innovative behavior, the higher the learning innovation produced at SMKN Pasaman Regency. This is crucial considering that Vocational High Schools are required to produce graduates with competencies aligned with developments in science, technology, and the needs of the workplace. Principals need to continuously build an adaptive organizational culture, support teacher creativity, and facilitate continuous professional development. At the same time, teachers need to maintain work motivation and enhance innovative behavior through the use of technology, the development of learning media, the implementation of student-centered learning models, and collaboration with fellow teachers. With the synergy of these three factors, learning innovation at SMKN Pasaman Regency will continue to develop, improving the quality of the learning process and producing more competent graduates who are ready to face the challenges of the workplace. Effective leadership creates supportive conditions that encourage teachers to develop innovative behaviors, while teacher motivation strengthens teachers' willingness to explore and implement new instructional approaches. Furthermore, innovative behavior serves as an important mechanism through which teachers transform ideas into concrete improvements in classroom practices (Gorozidis & Papaioannou, 2014; Li & Zhang, 2026; Rahmani et al., 2025).

CONCLUSION

The principal's adaptive leadership has a positive and insignificant effect on the innovative behaviour of teachers, as determined by the interpretation of the research results and discussion. The innovative behaviour of teachers is significantly and positively influenced by their motivation. Teachers' learning innovation is significantly and positively influenced by innovative behaviour. The principal's adaptive leadership has a positive and insignificant impact on the innovation of learning among teachers. The learning innovation of teachers is significantly and positively influenced by teacher motivation. The principal's

adaptive leadership has been unable to mitigate the impact of innovative behaviour on the learning innovation of teachers. The influence of teacher motivation on the learning innovation of teachers is mediated by innovative behaviour. The adaptive leadership, teacher motivation, and innovative behaviour of the principal have a positive and substantial impact on the learning innovation of teachers. The principal's adaptive leadership has a positive impact on innovative behaviour and learning innovation; however, the effect is not yet significant. Therefore, principals need to improve their adaptive leadership capacity through leadership training, data-based decision-making, change management skills, and building open and collaborative communication. Schools need to develop programs that can increase teachers' intrinsic motivation, such as providing opportunities to participate in education and training, workshops, seminars, learning communities, and providing clear career development paths. In addition, schools need to implement an objective reward and recognition system for teachers who demonstrate achievement, creativity and innovation in learning so that teacher motivation can continue to increase.

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